

Name _____

Egg Osmosis Lab

Objectives:

- Observe and explain the changes that occur in a cell due to osmosis
- Distinguish among hypertonic, hypotonic, and isotonic solutions

Purpose:

In this lab you will use eggs as a model for a living cell. You will predict the results of an experiment that involves the movement of water through a membrane.

Background:

Some materials can pass through the cell membrane while others cannot. Polar molecules and ions must use transport proteins since they cannot pass through the nonpolar interior of the cell membrane. Water uses special transport proteins called aquaporins, and it moves from areas that have high concentrations of free water molecules to areas that have low concentrations of free water molecules through a process called osmosis. The movement of water in and out of the cell then depends upon the concentration of the solute and thus the concentration of free water molecules surrounding the cell. Cells can be in hypertonic solutions, hypotonic solutions, or isotonic solutions. Hypotonic solutions have a lower solute concentration than the cell, hypertonic solutions have a higher solute concentration than the cell, and isotonic solutions have a solute concentration that is equal to that inside the cell. Depending on what type of solution surrounds a cell, it will either lose water, gain water, or stay the same size.

This lab will use a raw egg as a model for a living cell. Under the shell, the egg has a membrane that acts much like the cell membrane. For this lab, the shell has been removed by dissolving it in vinegar to allow movement of water across the membrane. This process took about 24-36 hours.

Procedure:

1. CAREFULLY find the mass of the eggs soaked in vinegar. (The purpose of soaking the egg in vinegar was to remove the shell.) Record the mass in the appropriate table.
2. Soak one egg in distilled water and one egg in syrup overnight.
3. Fill in your hypotheses.
4. After 24 hours, CAREFULLY find the mass of each egg and record data.
5. Calculate the percent change in mass of each egg.

$$\text{Percent Change} = \frac{(\text{Final Mass} - \text{Initial Mass})}{\text{Initial Mass}} \times 100\%$$

6. Record observations (appearance of each egg) and record in the appropriate table.
7. Add your data to the class data on the board.
8. Calculate the class averages for the percent change in mass and record.
9. Interpret the results by answering the analysis questions using complete sentences.
10. Use the attached reading to answer the osmoregulation questions using complete sentences.

Hypotheses:

- What do you think will happen to the mass of the egg soaked in distilled water and why?
- What do you think will happen to the mass of the egg soaked in syrup and why?

Data:

Table 1: Appearance of Eggs

Egg in Solution	Observations (appearance of egg)
Distilled Water	
Syrup	

Table 2: Mass of Eggs

Egg in Solution	Initial Mass of Egg (g)	Final Mass of Egg (g)	Change in Mass (g) ($F-I$)	Percent Change in Mass
Distilled Water				
Syrup				

Table 3: Class Average of Percent Change in Mass

Egg in Solution	Class Average of Percent Change in Mass
Distilled Water	
Syrup	

Analysis: Answer the following questions using COMPLETE SENTENCES!

1. Why were the eggs originally soaked in vinegar?
2. What happened to the mass of the egg soaked in distilled water and WHY?
3. What happened to the mass of the egg soaked in syrup and WHY?
4. Which egg was soaked in a hypertonic solution? EXPLAIN
5. Which egg was soaked in a hypotonic solution? EXPLAIN
6. Were your hypotheses supported by the data? Why or why not? (Use direct evidence from your lab.)
7. What might happen to the plants in a freshwater wetland if saltwater from an estuary or the ocean suddenly flooded it? Explain your answer.
8. Why do grocery stores spray their fresh produce with water?
9. If a shipwrecked crew drank salt water, they could die. Explain why.
10. If a bowl of fresh strawberries is sprinkled with sugar, a few minutes later they will be covered with juice. Explain why this happens.

Osmoregulation Questions

Read “Osmoregulation” and answer the following questions in complete sentences.

1. How do freshwater fish deal with all of the water that flows into them as a result of living in a hypotonic environment?
2. Why do marine fish have special gills? What would happen to them if these gills did not work?
3. Use the diagram from the reading to explain how the human body conserves water.
4. How does the body rid itself of excess water?
5. Explain how osmoregulation is a good example of homeostasis.